

REMARKS

As a preliminary matter, Applicants request the Examiner to acknowledge and consider the references cited in the Information Disclosure Statement dated April 18, 2003. The Information Disclosure Statement complies with 37 C.F.R. § 1.98(b) because each cited reference that the Applicants asked the Examiner to consider was properly identified and included in the April 18 submission.

Reconsideration and allowance of this application are respectfully requested. Claims 1-183 are pending in this application. Claims 1-36, 45-59, 61, 73-87, 118, 129, 132-183 were previously withdrawn from consideration. Claims 37-44, 60, 62-72, 88-117, 119-128, 130, and 131 stand rejected. The rejections are respectfully submitted to be obviated in view of the remarks presented herein.

35 U.S.C. § 102 (b)

Claims 37-44, 60, 62-65, 68-71, 88-102, 105-117, 119-124, 127, 128, 130 and 131 stand rejected under 35 U.S.C. 102(b) as allegedly being anticipated by U.S. Patent No. 5,569,958 to Bloom. Applicants respectfully traverse the rejection and request reconsideration in light of the following remarks.

Claim 37 recites: “A semiconductor package comprising a hermetically sealed enclosure surrounding said package. . . a first gas within said enclosure; and a source of releasable hydrogen within said enclosure, said releasable hydrogen capable of pressurizing the space within said enclosure to a pressure above the pressure associated with said first gas.”

The Office Action asserts that the limitation “said releasable hydrogen capable of pressurizing the space within said enclosure to a pressure above the pressure associated with said first gas,” “does not constitute a limitation in any patentable sense.” (Office Action at p. 3). Applicants respectfully disagree because the aforementioned limitation is a functional definition of the amount of hydrogen gas which must be present within the enclosure. Put another way, claim 37 recites a semiconductor package comprising, *inter alia*, an amount of a chosen releasable hydrogen source sufficient to elevate the pressure within the enclosure. As explained in the specification (and depicted in Fig. 1), the amount of hydrogen gas available from a “releasable source,” depends on the type of source, or hydride, selected and the temperature of the operating parameters because the hydrogen concentrations fall off with increasing temperatures. Hence, defining the releasable hydrogen as “capable of pressuring the space within said enclosure” defines the amount of hydrogen releasable source which must be present. As such, applicant submits that this language does put a positive limitation on the claimed elements.

Moreover, even if “capable of pressurizing the space within said enclosure to a pressure above the pressure associated with said first gas” points to a purely “functional difference” between the claimed invention and the cited reference, as argued in the Office Action (p.10), Applicants respectfully urge that such a functional limitation must be considered by the Examiner.

The claimed limitation fits within the M.P.E.P.’s definition of a functional limitation. M.P.E.P. 2173.05 (g) states: “A functional limitation is often used in association with an element, ingredient, or step of a process *to define a particular capability*

or purpose that is served by the recited element, ingredient or step.” (emphasis added).

“[S]aid releasable hydrogen capable of pressurizing the space within said enclosure to a pressure above the pressure associated with said first gas” defines a capability of the claimed element, and therefore, effectively limits the elements in claim 37.

Despite the Office Action’s assertion that the limitation “does not constitute a [positive] limitation in any patentable sense,” as a functional limitation, the claim language *does* constitute a limitation in a patentable sense, and the examiner is required to consider it as such. As stated in the M.P.E.P., “[a] functional limitation must be evaluated and considered, just like any other limitation of the claim. . . .” (M.P.E.P. 2173.05(g)).

Upon consideration of this limitation, Applicant respectfully urges that the claimed invention is not anticipated by Bloom for at least the following reasons.

Applicants’ claim 37 defines a semiconductor package comprising, *inter alia*, a source of releasable hydrogen that is capable of pressurizing the space within said enclosure to a pressure above the pressure associated with said first gas. Applicants’ claimed structure is different from that disclosed by Bloom. For example, Bloom discloses hermetic vias, not Applicants’ claimed “hermetically sealed enclosure” surrounding a semiconductor package. Bloom discloses “an electronic component base with a via fill composition that is capable of deforming to accommodate dimensional changes in both the base and fill composition without loss of hermeticity, which occur as a result of heating to elevated temperatures,” and that “this composition includes an effective amount of an appropriate metal, up to about 10% of at least one active agent and an organic vehicle.” (Bloom, at Col. 2, lines 16-

23). The active agent described by Bloom includes hydrides (column 5, lines 36-49). In the example relied upon by the Office Action, Bloom discloses a “silver-based fill composition” in which the active agent is “1% titanium hydride” (column 8, lines 21-39).

But, Applicants’ claimed “source of releasable hydrogen” clearly distinguishes over the active agent (e.g., hydride) disclosed by Bloom. It is clear from Bloom’s disclosure that the active agent is used to facilitate the preparation of the fill composition, not to provide a source of releasable hydrogen “capable of pressurizing the space within said enclosure to a pressure above the pressure associated with said first gas,” as recited in claim 37. In fact, Bloom discloses that “[i]t is generally preferred to utilize relatively small particles of the active agent to promote dispersion of the agent throughout the via fill composition. The via fill compositions are generally formed by combining the powdered metal(s) and active agent(s) with the organic vehicle and mixing until a pasty consistency is obtained” (column 6, lines 10-15). See also Bloom column 5, lines 41-44, where the active agent is described in the context of soldering and brazing (“Two informative works on active agents are, ‘Principles of Soldering and Brazing’, Humpston, G. and Jacobson, D., ASM Int., page 164, 1993; and ‘Brazing’, Schwartz, M., ASM Int., page 120, 1987, which are herein incorporated by reference.”). The Bloom active agent is not capable of generating hydrogen gas, as recited in Applicants’ claim 37. There is no teaching or suggestion whatsoever in Bloom of Applicants’ claimed “source of releasable hydrogen within said enclosure, *said releasable hydrogen capable of pressurizing the space within said enclosure to a pressure above the pressure associated with said first gas.*” Therefore, Bloom does not anticipate the claimed invention recited in claim 37.

Claims 38-44 and 60 are dependent upon claim 37. Applicants respectfully submit that these claims are allowable along with claim 37, for the reasons set forth above and on their own merits.

Independent claims 88 and 112 are similarly allowable. For example, claims 88 and 112 recite in pertinent part “a source of releasable hydrogen within said enclosure, *said releasable hydrogen capable of pressurizing the space within said enclosure to a pressure above the first pressure.*” As set forth above, Bloom does not disclose this claimed element, thus, Bloom fails to anticipate the claimed invention. Claims 89-98 and 113-120 depend from claims 88 and 112, respectively, and are allowable along with the base claims, for the reasons set forth above and on their own merits.

Independent claims 62, 99, and 121 are also allowable. Each of these claims recites “said gas comprising a first gas component and a second gas component, wherein said second gas component results from the release of said releasable hydrogen, and wherein said first gas component is initially present within said enclosure prior to the release of said releasable hydrogen, and said first gas component is initially present at a pressure lower than said elevated pressure.” Bloom does not disclose the claimed feature of the source of releasable hydrogen, thus Bloom does not disclose the claimed invention. Claims 63-72, 100-111, 122-128, 130, and 131 depend from claims 62, 99, and 121 and are therefore allowable along with the base claims for the reasons set forth above and on their own merits.

With regard to claim 60, the Office Action refers to this claim as a product-by-process claim. Applicants respectfully traverse this statement. Claim 60 refers to a structural limitation of the attachment of the chip, not to a limitation of the process of attaching the chip. The Federal Circuit has held that claim limitations which confer distinct and defined characteristics of a structure are “pure product claims” and not product-by-process claims. In Hazani v. U.S. Int’l Trade Comm’n, the Federal Circuit considered patent claims to a memory cell comprising a conductive plate having a surface that was “chemically engraved.” Hazani v. U.S. Int’l Trade Comm’n, 126 F.3d 1473, 44 USPQ2d 1358 (Fed. Cir. 1997). The Federal Circuit said that the claims were “best characterized as pure product claims, since the ‘chemically engraved’ limitation, read in context, describes the product more by its structure than by the process used to obtain it.” Id. Claim 60 recites “A package according to claim 37, further comprising a substrate, wherein said chip is attached to the substrate with a controlled collapse chip connection.” The “controlled collapse chip connection,” that the Office Action points out, is not product-by-process claim language. Instead, it is purely structural language describing the chip, just as “chemically engraved” described the structure of a memory cell’s plate in Hazani. Therefore, Applicants assert that claim 60 is not a product-by-process claim. Furthermore, Applicant respectfully urges that claim 60 is allowable for the reasons mentioned above.

35 U.S.C. § 103(a) Bloom and Han

Claims 66, 67, 103, 104, 125 and 126 stand rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Bloom in view of U.S. Patent No. 6,281,135 to Han et al. For at least the following reasons, each of these rejection is respectfully traversed.

Claims 66 and 67 depend from claim 62. As such, they recite “a hermetically sealed enclosure. . . [and] a source of releasable hydrogen within said enclosure. . . .” As set forth above, Bloom fails to teach this limitation.

The Office Action relies upon Han for its purported teachings related to limitations such as Applicant’s claimed gas composition. Regardless of any such teachings, Han does not rectify the deficiency associated with Bloom, i.e., the failure to anticipate Applicants’ claimed structure having, *inter alia*, a “source of releasable hydrogen within said enclosure, *said releasable hydrogen capable of pressurizing the space within said enclosure to a pressure above the pressure associated with said first gas.*” Thus, the asserted combination of disclosures would not have rendered obvious the embodiments of the invention defined by any of the rejected claims. Claims 103, 104, 125, and 126 recite similar limitations and are allowable for at least the reasons set forth above and on their own merits. Because the combination of references does not teach or suggest each limitation of the claimed invention, as required to support a *prima facie* case of obviousness, the Applicant respectfully requests allowance of claims 66, 67, 103, 104, 125 and 126.

35 U.S.C. § 103(a) Bloom and Polak

Claim 72 stands rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Bloom in view of U.S. Patent No. 5,689,089 to Polak et al. This rejection is respectfully traversed and reconsideration is requested for at least the following reasons.

Claim 72 depends from claim 62. As such, it recites “a hermetically sealed enclosure. . . [and] a source of releasable hydrogen within said enclosure. . . .” As set forth above, Bloom fails to teach this limitation.

The Office Action relies upon Polak for its purported teachings related to limitations such as Applicant’s claimed gas pressures. Regardless of any such teachings, Polak does not rectify the deficiency associated with Bloom, i.e., the failure to anticipate Applicants’ claimed structure having, *inter alia*, a “source of releasable hydrogen within said enclosure, *said releasable hydrogen capable of pressurizing the space within said enclosure to a pressure above the pressure associated with said first gas.*” Thus, the asserted combination of disclosures would not have rendered obvious the embodiments of the invention defined by the rejected claim. Because the combination of references does not teach or suggest each limitation of the claimed invention, as required to support a *prima facie* case of obviousness, the Applicant respectfully requests allowance of claim 72.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

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Respectfully submitted,

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